Tubular metaplasia in Bowman’s capsule

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SYNOPSIS Proximal tubular type metaplasia of the epithelium of Bowman’s capsule is described in a fit young adult male. This form of metaplasia is unlike those previously described and could cause initial confusion if encountered in a percutaneous renal biopsy.

The upper part of the nephron can be divided into the renal corpuscle, or Bowman’s capsule, the neck portion, and the proximal tubule (Rouiller, 1969). In man Bowman’s capsule is lined by an inconspicuous layer of flattened squamous cells (Allen, 1962; Brewer, 1964; Heptinstall, 1967); in the mink and mouse the parietal capsular epithelium is cuboidal (Crabtree, 1940; Rouiller, 1969). The neck portion, seen in lower animals but not in man, is lined by an epithelium which has the cytological characteristics of the proximal tubule (DuBois, 1969). Two types of metaplasia of the capsular epithelium have been described, an adenomatoid type (Eisen, 1946; Chappell and Phillips, 1950; Nachman, 1962; Macpherson, 1963) and a columnar type (Lloyd Thomas, 1953; Finckh and Joske, 1954). A third variety is now described.

Case Report
A fit young adult male (aged 19) died from multiple injuries sustained in a road traffic accident. Necropsy revealed no evidence of pre-existing disease. The kidneys were of normal size, weight, and texture.

Histopathology
Twenty-five per cent of the glomeruli show a high cuboidal epithelium replacing the normal flattened epithelium of Bowman’s capsule. The cuboidal epithelium is usually situated opposite to the vascular pole of the glomerular tuft, but may extend around much of the capsule (Figs. 1 and 2). The cells have regular nuclei situated towards the basal pole of the cell, and an eosinophilic cytoplasm. Some cells show some basal striation, whilst all show a prominent brush border which stains intensely with the periodic-acid-Schiff (PAS) method. The cytological characteristics are identical to those of the neighbouring proximal tubular epithelial cells. In some glomeruli direct continuity can be demonstrated between the proximal tubular epithelium and the metaplastic epithelium of Bowman’s capsule (Figs. 3 and 4). No other abnormalities were detected in the kidney.

Discussion
Instances of metaplasia of the capsular epithelium are reported rarely in the literature, and one must assume that this is an uncommon finding. The two types so far described differ on cytological and clinical grounds (Table).

The adenomatoid type (Eisen, 1946) occurs in both sexes and at varying ages. All patients have advanced, disseminated malignancy, usually involving the liver. The columnar type (Lloyd-Thomas, 1953) occurs in both sexes but all patients are under 25 years. No patient in this group had any evidence of malignant disease, although four had diabetes (Finckh and Joske, 1954).

The present case, representing a third variety of
Fig. 1  Glomerulus showing prominent tubular metaplasia of the capsular epithelium opposite the vascular pole of the glomerulus. Haematoxylin and eosin × 125.

Fig. 2  Tubular metaplasia with prominent brush border. Periodic acid Schiff × 125.

Fig. 3  Glomerulus showing continuity between metaplastic capsular epithelium and tubular epithelium. Haematoxylin and eosin × 125.

Fig. 4  Glomerulus showing continuity between metaplastic capsular epithelium and tubular epithelium. Note the prominent capsulo-tubular junction. PAS × 125.
A. Milford Ward

**Table Two types of metaplasia of the capsular epithelium**

<table>
<thead>
<tr>
<th>Case</th>
<th>Author</th>
<th>Sex</th>
<th>Age</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Eisen (1946)</td>
<td>F</td>
<td>54</td>
<td>Metastatic carcinoma gallbladder</td>
</tr>
<tr>
<td>2</td>
<td>Chappell &amp; Phillips (1950)</td>
<td>M</td>
<td>16</td>
<td>Metastatic carcinoma adrenal</td>
</tr>
<tr>
<td>3</td>
<td>Nachman (1962)</td>
<td>F</td>
<td>6/12</td>
<td>Metastatic carcinoma liver</td>
</tr>
<tr>
<td>4</td>
<td>Macpherson (1963)</td>
<td>F</td>
<td>74</td>
<td>Metastatic carcinoma (?) breast</td>
</tr>
<tr>
<td>5</td>
<td>Lloyd-Thomas (1953)</td>
<td>F</td>
<td>14</td>
<td>Type II nephritis</td>
</tr>
<tr>
<td>8</td>
<td>Finckh &amp; Joske (1954)</td>
<td>M</td>
<td>15</td>
<td>Diabetes: no evidence of renal disease</td>
</tr>
<tr>
<td>11</td>
<td>Present case</td>
<td>M</td>
<td>19</td>
<td>No evidence of renal disease</td>
</tr>
</tbody>
</table>

Metaplasia of the capsular epithelium, has features in common with the columnar type, with the exception of the prominence of the cytological features of proximal tubular epithelium. It seems unlikely that this feature would have been overlooked in the case described by Lloyd-Thomas (1953) as the PAS method was used to demonstrate the basement membrane thickening of type II nephritis.

The aetiology of this lesion is obscure. Finckh and Joske (1954) suggested persistence of some foetal structure or potentiality, but neither columnar nor tubular change is seen in foetal or neonatal material. It is possible that it represents a maldevelopment of the renal corpuscle and that the upper part of the proximal tubules has had to dilate to accommodate the glomerular tuft. If this were the case, one would expect some evidence of incompetence of the capsulo-tubular junction with prolapse of the glomerular tuft. This is not seen, although Finckh and Joske (1954) did note this feature once in one patient. Figures 3 and 4 emphasize the competence of the capsulo-tubular junction in this patient.

The adenomatoid metaplasia described by Eisen (1946) may well have a different aetiology.

The lesion appears to have no pathological significance.

I wish to thank Dr H. H. Pilling, H.M. Coroner for the City of Sheffield and the West Riding of Yorkshire, Rotherham Division, for permission to publish details of this case.

**References**


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